

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 1, 2017/2018

**PEM0016 – ALGEBRA**  
JUNE INTAKE

23 OCTOBER 2017  
9.00 a.m to 11.00 a.m  
(2 Hours)

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### INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of marks for each question is given.
3. Please write all your answers in the answer booklet provided.

**Answer ALL the questions (100 marks).****Question 1 (25 Marks)**

(a) Solve the inequality and express your answer using interval notation.

$$\frac{(-x + 5)^2(x - 4)(x + 1)}{x^2 + x - 6} \leq 0$$

(8 marks)

(b) Find in the simplest form, the first 3 terms of the expansion of  $(1 - 2x)^5$ , in ascending power of  $x$ . Then determine the coefficient of  $x^3$  in the expansion of  $(1 + x)(1 - 2x)^5$ .

(9 marks)

(c) Solve  $\sqrt{3x - 5} - \sqrt{x + 7} = 2$ .

(8 marks)

**Question 2 (25 Marks)**

(a) Given function  $f(x) = \frac{1}{2x-1}$  and  $g(x) = \sqrt{x+1}$ .

(i) Determine  $f \circ g(x)$ . (2 marks)

(ii) Determine the domain of  $(f \circ g)(x)$  and express the domain using **solution set**. (4 marks)

(b) Determine the inverse function of  $h(x) = 3^{2x+1}$ . (4 marks)

(c) Solve the following equations.

$$\begin{aligned} 8^{x-1} \times 2^{2y+1} &= 4^7 \\ 9^{y-4} \times 3^x &= 3^4 \end{aligned}$$

(6 marks)

(d) Sketch the function  $k(x) = -2(x+1)^2 + 2$  using transformations.

Show each transformation in separate graph.

Label three coordinates in each graph.

(9 marks)

**Continued...**

**Question 3 (25 Marks)**

(a) Find the partial fraction decomposition of  $\frac{3x^3 + 3x^2 + 5x + 6}{x^2(2x^2 + x + 3)}$ . (12 marks)

(b) It is given that  $f(x) = 2x^3 - x^2 - 13x - 6$ .

(i) Show that  $f(x) = x + 2$  is a factor of  $f(x)$ . (1 mark)

(ii) Determine the zeros of  $f(x)$ . (5 marks)

(iii) What is the maximum number of turning point and  $y$ -intercept? (2 marks)

(iv) Sketch  $f(x)$ . (5 marks)

**Question 4 (25 Marks)**

(a) Solve the following equations by using **inverse matrix method**.

$$\begin{cases} -x + 3y + 4z = -4 \\ 2x + 5z = 31 \\ x - y + 2z = 20 \end{cases}$$

(17 marks)

(b) Given that  $B = \begin{bmatrix} k & -1 \\ 3 & 5 \end{bmatrix}$  and the determinant of  $B$  is 13.

(i) Determine  $k$ . (2 marks)

(ii) Matrix  $C$  and matrix  $A$  are  $2 \times 2$  matrix. Determine matrix  $A$  if

$$2B + CC^{-1} - A = \begin{bmatrix} 0 & -4 \\ 7 & 13 \end{bmatrix}$$

(4 marks)

(c) Given  $P = \begin{bmatrix} 1 & -20 & 5 \\ 2 & 3 & 5 \end{bmatrix}$  and  $Q = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ .

Determine  $PQ$ . Justify your answer if there is no solution.

(2 marks)

**End of Paper**